P-T evolution of high pressure mafic granulites from Nilgiri Block, southern India

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The Nilgiri Block, situated in the northern part of southern granulite terrane, India, is an uplifted granulite grade lower crust, made up predominantly of orthopyroxene-bearing, granulite-facies, granitic/tonalitic to mafic/ultramafic rocks. The metamorphic evolution of the Nilgiri Block and its collision on to the Dharwar craton are examined by the study of mineral chemistry and pseudosection modeling of mafic granulites. Mafic granulites are present as discrete bodies intruded into massive charnockites in the central part of the block. Labradorite and orthopyroxene have been present as main inclusions in garnet and clinopyroxene. This indicates that during the initial stage of evolution the mafic rocks have gone through the labradorite and orthopyroxene stability field. Following this, most of the labradorite and orthopyroxene reacted to form garnet, clinopyroxene and ilmenite. These reactions represent a high pressure metamorphism in a collisional environment. This is also obvious by a steep increase in *P-T* path in phase diagram (Fig. 1). As the pressure increased during the collision, most of the orthopyroxene reacted with plagioclase to form Grt + Cpx + Pl + Rt assemblage representing peak metamorphic conditions. After going through high pressure granulite facies metamorphism, the metamorphic path took a sharp turn towards the amphibolite facies due to late hydration possibly related to the shear zone formation, and is identified as the last stage of metamorphism. From psuedosection modeling using Perple_x_6.6.7 in this study, we establish that metagabbro emplaced into felsic granulties represent a mafic underplating during the suturing of the Nilgiri Block into the Dharwar craton.

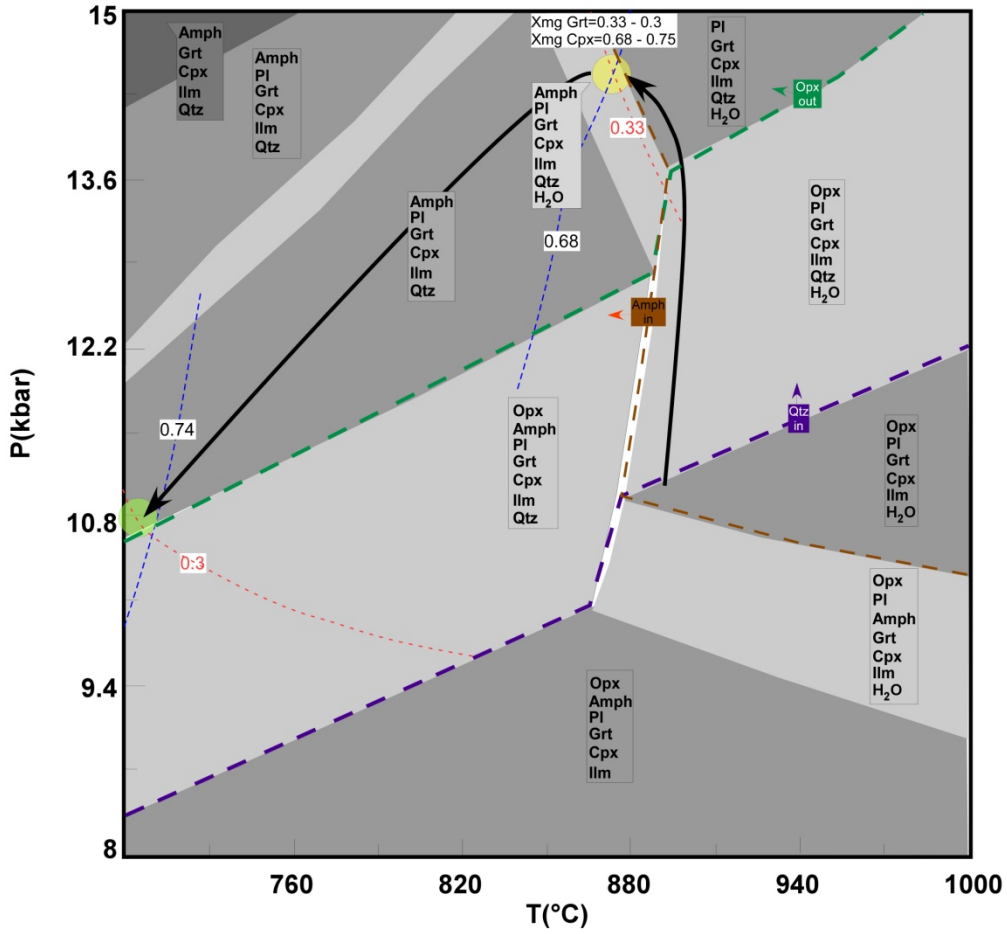

Figure 1. A phase diagram representing different stages of evolution of mafic granulites in Nilgiri Block